

them may sometimes make their Observations together, and that from divers Experiments we may be the better assured of what certainty and exactness such kind of Observations are like to prove. And because many of the Stars which may happen to come within the compass of such an *Iconism*, or Map, may be such as are only visible through a good *Telescope*, whose Positions perhaps have not been noted, nor their longitudes, or latitudes, any where remarked; therefore each Observer should endeavour to insert some fixt Star, whose longitude, and latitude, is known; or with his *Telescope* he shall find the Position of some notable *telescopic* Star, inserted in his Map, to some known fixt Star, whose place in the *Zodiack* is well defin'd.

Having by this means found the true distance of the Moon, and having observed well the *apparent Diameter* of it at that time with a good *Telescope*, it is easie enough, by one single Observation of the *apparent Diameter* of the Moon with a good *Glass*, to determine her distances in any other part of her *Orbit*, or *Dragon*, and consequently, some few Observations will tell us, whether she be mov'd in an *Ellipsis*, (which, by the way, may also be found, even now, though I think we are yet ignorant of her true distance) and next (which without such Observations, I think, we shall not be sure of) we may know exactly the bigness of that *Ellipsis*, or Circle, and her true velocity in each part, and thereby be much the better enabled to find out the true cause of all her Motions. And though, even now also, we may, by such Observations in one station, as here at *London*, observe the *apparent Diameter* and motion of the Moon in her *Dragon*, and consequently be enabled to make a better guess at the *Species* or kind of Curve, in which she is mov'd, that is, whether it be spherical, or *elliptical*, or neither, and with what proportional velocities she is carried in that Curve; yet till her true *Parallax* be known, we cannot determine either.

Next, for the true distance of the Sun, the best way will be, by accurate Observations, made in both these forementioned stations, of some convenient Eclipse of the Sun, many of which may so happen, as to be seen by both; for the *Penumbra* of the Moon may, if she be sixty Semi-diameters distant from the Earth, and the Sun above seven thousand, extend to about seventy degrees on the Earth, and consequently be seen by Observators as far distant as *London*, and *St. Helena*, which are not full sixty nine degrees distant. And this would much more accurately, then any way that has been yet used, determine the *Parallax*, and distance, of the Sun; for as for the Horizontal *Parallax* I have already shewn it sufficiently uncertain; nor is the way of finding it by the Eclipse of the Moon any other then hypothetical; and that by the difference of the true and apparent quadrature of the Moon is less not uncertain, witness their Deductions from it, who have made use of it; for *Vendeline* puts that difference to be but 4'. 30", whence he deduces a vast distance of the Sun, as I have before shewn. *Ricciolo* makes it full 30'. 00. but *Reinoldus*, and *Kircher*, no less then three degrees. And no wonder, for if we examine the *Theory*, we shall find it so complicated with uncertainties.

First,

First, From the irregular surface of the Moon, and laxes, that unless the *Dichotomy* happen in the *Nonage tick*, and that in the Meridian, &c. all which happen, that it is almost impossible to make them otherwise. Besides, we are not yet certain, but that there may be the Moon *analogous* to the Air about the Earth, which diffuſion of the light of the Sun, and consequently make the *dichotomy* of the Moon. Their way is rational and ingenious; and such as is much to be preferred by the Horizontal *Parallax*, could all the uncertainties be removed, and were the true distance of the Moon known.

But because we find by the Experiments of *Vendeline* that Observations of this kind are very uncertain also, whilst, that such kind of Observations, made at two stations, were promoted. And it is so much the more desirable what I have now shewn of the nature of the Air, if it were refraction may be very much greater then all the Astronomers have imagined it: And consequently, that the distance of other Planets, may be much less then what they have hitherto supposed it.

For first, this Inflection, I have here propounded, sheweth the shadow of the Earth to be much shorter then it can be made by the *Hypothesis* of refraction, and consequently, the Moon in an Eclipse, unless it comes very much nearer the Earth then hitherto have supposed it.

Secondly, There will not in this *Hypothesis* be any other shadow of the Earth, such as *Kepler* supposes, and calls the *Penumbra* of the refracting *Atmosphere*; for the bending of the Rays together caus'd by *Inflection*, as I have already shewn, which is ascribed by *Kepler*, and others after him, to the dark part, which is without the *umbra terræ*, does close this *Hypothesis* there is no refracting surface of the Air, there can be no shadows, such as appear in the ninth *Scheme*, where let *ABCD* represent the Earth, and the *Atmosphere*, which according to *Kepler's* supposition, is like a terminated with an exact surface *EFGH*, let the lines *KH*, represent the Rays of the Sun; 'tis manifest, that between *LB*, and *ID*, will be reflected by the surface *BAD*, and consequently, the conical space *BOD* will be obscure; but, say the followers of *Kepler*, the Rays between *LB*, and between *ID*, and *KH*, falling on the *Atmosphere*, are refracted, both at their ingress and egress out of the *Atmosphere* towards the Axis of the spherical shadow *CO*, and consequently a great part of that former dark Cone, are shortened, and to *N*. And because of this Reflection of these Rays, say superinduc'd another shell of a dark Cone *FPH*, whose vertex is further distant from the Earth: By this *Penumbra*, say